SENSATIONAL ADVANCES MADE IN WAR MACHINES

Flashless Powder, Long Sought, Devised at Last and One of Army's Precious Secrets---New Extreme Range for Navy's 16-Inch Rifle a Fact, While Automotive Carriages for All Types of Weapons and Transport Have Been Developed Tremendously---Anti-Aircraft Machine Gun and 4,000 Pound Aerial Bomb Other Surprises

Here is one of the first photographs of the navy's 16 inch rifle which has an extreme range of 35 miles when the new high angle barbette turret is used. The shell weighs 2,400 pounds.

Inspecting an armor plate of the heavier type after three 16 inch shells had hit it in the recent tests at Aberdeen, Md. A notable gathering of engineers studied the results of the tests.

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THE famous army mule that used to wiggle his ears and then balk during the most critical moment of a battle is now a thing of the past. He is cooling his heels in some stable outside a Government reservation, his job having been taken over by something far less obstinate—the tractor.

In future wars every ounce of fighting material will be transported by machinery—airplanes to some extent, but for the most part by motor driven land vehicles capable of negotiating every kind of terrain at high speed. It is for this that the United States Army is now building.

During a day devoted to viewing some of the new and marvellous developments in army ordnance I have just had the opportunity of seeing the various types of tractors adopted as standard equipment for the land fighters. There are kinds without number—large and small, for every possible purpose. Most of them have been devised since the war, completed from ideas that suggested themselves while the world conflict was at its height. They passed in review in a long line and then, with their funny ambling gaits, proceeded with the more practical demonstration of what they would be able to do in the face of enemy fire.

Tank Was the First Idea On Which All Are Built

It is not such a far cry from the development of the tank. This unique fighting machine, which made its appearance two years after the world war began, was the forerunner of the present day equipment. The tank, as the British officer who developed it told me at the time, was the outgrowth of the ordinary, everyday, muddy American farm tractor. So that this homely instrument of cultivation can only be regarded as the grandfather of what is now a deadly tool of war.

The most remarkable of all the development is the tractor artillery, which includes the heaviest of the types of mobile field pieces. Set low to the ground, with belts running around the wheels, these powerful weapons, well protected with armor plate, are able to travel at speeds around twenty miles an hour, which means much in the advance of an army. Some of the heaviest of the guns are assisted by tractor trucks that go a few feet ahead, carrying the personnel that will man them, at the same time generating electrical power which is transmitted by cable to the gun tractor.

On ordinary occasions these tractors will travel along roads, but it is not essential that they do so. They are able to negotiate any kind of land, cut across fields, get in and out of mud holes and go over country that is under cultivation. The belts around the wheels prevent the heavy loads from sinking into the ground.

It would be impossible to attempt to describe the various types of mounts that have been provided by the ordnance officers for the artillery of to-day. They vary almost as much as the types of guns vary—and it is well known that there is a piece of heavy ordnance for almost every possible operation that may be necessary on the battlefield.

The tractor plan has been applied also to every auxiliary vehicle that is required in warfare. There are tractors for carrying ammunition, tractors for carrying baggage, tractors for carrying men, and of course various kinds of tanks.

Real Land Battleships Have Been Perfected Now

The heavily armored tanks that are capable of hauling a score of men operating machine guns have been supplemented by smaller tanks to carry two or three. These tiny machines seem much like great bugs as they travel along at high speed. They are virtually land battleships.

Even more wonderful in their mechanism are the tremendous guns the army has just built for the coast defences. These are 16-inch guns, weighing each 340,000 pounds, firing a projectile of 2,340 pounds. The powder charge is 850 pounds. When they are shot the heavens and the earth seem to rock. Those who stand near by are forced to place their fingers in their ears to save their ear drums.

There is a belch of flame thirty feet long, a deafening report and heavy black smoke that settles down around the great piece of ordnance. One of these guns, on a disappearing carriage, is intended for the fortifications of New York. Another, which is to be used elsewhere, is on a stationary carriage. The shell is hurled a distance of thirty-five miles, far exceeding any effective range of any other gun.

The heaviest guns that are mobile—that is, that may be sent from place to place as operations require—are mounted on railroad carriages. These are 12-inch guns of various models. Many railroad cars are on the sidings at Aberdeen ready to move up and down the coast in case of necessity.

Great Crater 40 Feet Deep From 4,000 Pound Air Bomb

Across from the administration building about a mile is a great crater in the ground, looking much like the excavation for a ten story building. It is forty feet deep and measures a hundred feet across. It was caused by the dropping of a 4,000 pound bomb, by all weight and measurement the deadliest piece of ammunition ever constructed.

This bomb was dropped by Capt. N. R. Carolin of the air service, whose job it is to test out from an airplane the deadly bombs that are devised by the ordnance officers. He carried it up in a Handley Page airplane, a feat in itself that involved the greatest risk.

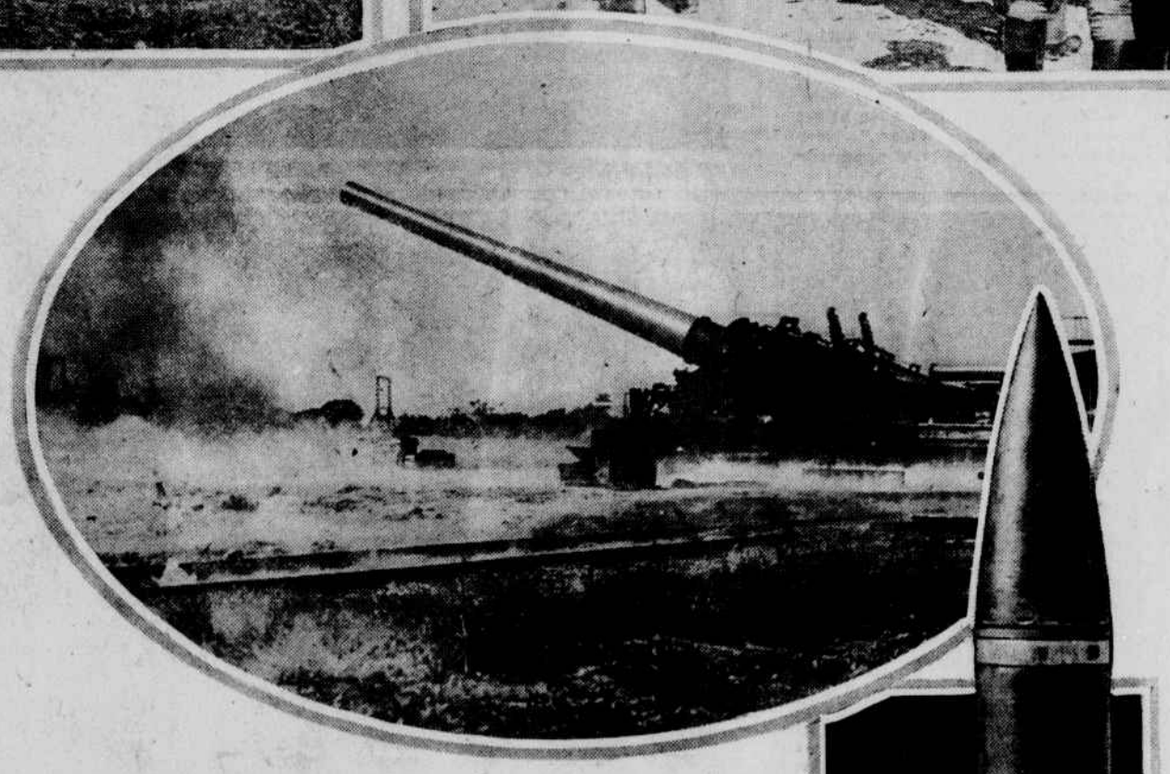
Had the machine performed badly at the taking off a crash might have resulted which would have destroyed not only the occupants of the airplane but also many of the buildings of the proving grounds and with them a large number of the personnel.

Capt. Carolin dropped the bomb from an altitude of 5,000 feet, and it was possible, a mile and a half away, to follow its course to the ground. It hit long before any evidence of the fact could be observed. Then there rushed up to a height of 500 feet a mighty sheet of flame and earth and smoke. Soon there came across the field a tremendous, but muffled, roar.

In observing the crater afterward I found that the force of the explosion was so great that the bomb, 50 per cent. of which was TNT, had completely destroyed itself. There were one or two tiny pieces of the casing, but that was all.

A hundred men digging for a week could not have caused such a hole in the ground. For 500 feet around there was pulverized earth. The leaves were torn off all the nearby trees and the branches twisted.

The practical purpose of such a bomb as this would be in time of war to destroy the heavy fortifications of the enemy. Only two of these bombs ever have been built. Only one has been dropped. The other is still in the hands of the army, for use in emergency.



The army's 16 inch gun on its railroad mount is almost as mobile as ordinary heavy artillery. Plans have been perfected to use many of these great guns in coast defence. At right is the 2,400 pound projectile that can be hurled 35 miles by the new types of 16 inch guns.

The rapid development of aerial warfare in recent months has led the ordnance experts of the army to devote much thought to defence against them, and it has brought about the completion of a new type of machine gun. This is known as the Thompson gun, which may be fired from any elevation up to 85 degrees.

New Anti-Aircraft Gun Sends Stream of Big Bullets

To demonstrate the efficiency of this gun the ordnance officers sent out a dozen toy balloons to serve as targets. Two of the machine guns were put into action against the balloons, half the number being pierced by the cartridges that were fired. Standing beside the gun it was possible to follow the rain of steel directed at the flying objects. The line was much the same as the stream of water sent out by a hose. The bullets were three-tenths of an inch in diameter.

The question of defence against aircraft is receiving, by the way, the utmost study from ordnance experts, and they regard the machine gun just developed as the first step.

In this connection a machine gun firing 50-calibre cartridges, or cartridges half an inch in diameter, has been built. It is the largest of the kind in the world. This machine gun was demonstrated to-day with cartridges fired at an old tank 5,000 yards across a field. The bullets were red hot as they chased each other out of the muzzle of the gun.

It was possible also to follow these with the naked eye across the field to the target, which was hit with remarkable accuracy. The demonstration in this instance, as in the others, was not one of marksmanship but one of material. Just the same it showed that such a gun is in a sense an aid to firing.

It is commonly recognized that what in the end will be the most practical way of fighting enemy aircraft will be with aircraft itself, and for this purpose rapid fire machine guns are being worked on to be mounted in these planes. The army, and the navy too, have had such weapons for a long time, but they have not been wholly satisfactory. The difficulties are, however, being overcome. The trouble is to get a gun that will not overheat.

These are mounted in the rear cockpit of the airplanes and may be fired in all directions, even through the swiftly moving propellers, this arrangement being automatic. It is interesting to note that the "kick" of such a gun is scarcely noticeable to the occupants of the airplane.

Flashless Powder Permits Concealed Night Firing

One of the newest developments of the ordnance section of the army, and something achieved since the end of the war, is "flashless" powder. This is a thing that the scientists who devote themselves to the art of making war have been seeking for many years. The need for it has been obvious since the time of the invention of gunpowder.

The trouble has come in night firing. In order to get the shell away a heavy powder charge is necessary, and it causes a flash from the gun the size of which is regulated by the calibre and the type. For the standard field artillery piece of 75 millimeters the flash is as much as five or six feet, and at night is very bright. This, it readily is perceived, reveals the position of the gun when fired at night, making it an easy target for the enemy. All the opposing battery has to do is to aim in the direction of the flash, estimate the distance and bang away until the gun is put out of action.

All this is corrected by the invention of flashless powder. When a gun is fired at night all that results is a deep red glow which is visible for only a short distance.

It would be extremely difficult for the enemy to locate a gun by means of this glow. It is hoped that finally the glow may be overcome altogether.

Just what ingredients are mixed with the powder to make it flashless is a secret that is carefully guarded by the ordnance officers of the army. All they will say for publication—and in their private conversation, too, for that matter—is that flashless powder has been developed.

A Great Military Secret, One No Other Power Has

Of course, the whole matter is one of preventing the information from falling into the hands of the enemy. It is an American military secret, and one that is unknown, so far as anybody in the United States is aware, in any other service.

Such developments as these are going on all the time at Aberdeen and at the various arsenals maintained by the United States Army. In this work the members of the technical staff within the service receive the help of outside scientists. There is the closest cooperation between them and the American Association of Mechanical Engineers and the American Association of Automotive Engineers. There is, to stimulate the interest, an organization known as the Army Ordnance Association, composed of members of the Ordnance Reserve Corps and manufacturers who might in time of national emergency be called upon to make munitions for the fighting forces.

This vast reservation is the scene of all the testing. It comprises thirty-five square miles of waste land fronting along the upper end of Chesepeake Bay. There are a dozen ranges for the firing of all kinds of guns and ammunition.

The tract was purchased by the Government soon after the outbreak of the world war, taking the place of the Sandy Hook and other proving grounds, which were found to be inadequate in size to test the material that had to go to the western front. It was of course retained as a permanent station for the American army.

Conan Doyle's World Trip to Investigate Spiritualism

By WILLIS STEELL.

"HOW is your son, Sir Arthur?"

"In fine health. You knew that he had advanced, what the world calls dead?"

"I'm so sorry, please excuse me, I hadn't heard."

"Why sorrow? If you wish to get in touch with him his control is so and so and the best medium is So-and-So."

Thus—put into dialogue form—is the way Sir Arthur Conan Doyle speaks of his dead son in his latest book, "The Wanderings of a Spiritualist," just out in England and soon to appear in America.

In the most matter of fact way this popular story teller, creator of Sherlock Holmes, whose mind, to judge by his fiction, never left the solid confines of this earth, disposes of death and the future life over which poets and philosophers and preachers have mulled before and since the Christian era without finding a clue to either.

Dr. Doyle believes that he has a message the most important the mind of man can conceive, implying the practical abolition of death and the reenforcement of our present religious views by the actual experience of those who have made the change from the natural to the spiritual body.

"Speaking of our own experiences," writes Sir Arthur, "my wife and I have actually spoken face to face beyond all question or doubt with eleven friends or relatives who have passed over, their direct voices being in each case audible and their conversation characteristic and evidential."

It was to deliver his message to the sorrowing parents and relatives of sons and brothers and husbands lost in the world war that soon after its close Sir Arthur made his voyage round the world. He felt especially that he wanted to deliver it in Australia, with whose sons he had become admiringly acquainted during the war. His latest book, therefore, is a garnering of psychic experience from spiritualists everywhere with a mixture of the ordinary events of travel fringing these in what makes a strange and frequently a ridiculous combination.

But Dr. Doyle had no doubt about the efficacy of spiritualism as a religion to heal the wounds of the world when he started on his long trip and he has less now that he has conferred with spiritualists the world over, for he says:

"I consider a genuine professional medium is the most useful member of the whole community. Alas! how few they are!

"But there are amateur mediums of various degrees, and the number tends to increase. Perhaps there will at last be an angel to every church as in the days of John. I see dimly the time when two congregations, the living and those who have passed on, shall move together with the medium angel as the bridge between them."

A description of Dr. Doyle's lectures, his appearance while delivering these, and what he said is included in an early chapter of the book, but after he had reached his true destination, Australia. It reads:

"It is not altogether a sombre journey he makes among the shadows, but apparently one of happy, as well as tender, experiences, so that laughter is not necessarily excluded from the exposition.

"Do not let that be misunderstood. There was no intrusion of the lightest flippancy. Sir Arthur the whole time exhibited that attitude of reverence and humility demanded of one traversing a domain on the border of the tremendous. Nothing approaching a theatrical presentation of the case for spiritualism marred the discourse. It was for the most part a plain statement."

Sir Arthur has said that he is continually aware of direct spirit intervention in his own life. Evidences convincing to himself he has put on record in "The New Revelation," and he therefore devotes more space in this book to the experiences of others.

In Melbourne he met a Mr. Tozer, head of the local spiritualists. This gentleman runs a rescue circle for the instruction of the lower spirits who are so material that they can be reached more easily by humanity than by the higher angels. The details of this school for the instruction of spirits are worth relating.

A wise spirit control dominates the proceedings. The medium goes into a trance. The spirit control then explains what it is about to do, and who the spirit is who is about to be reformed.

The next scene is often very violent, the medium having to be held down and using rough language. This comes from the low spirit who has suddenly found this means of expressing himself. At other times the language is not violent but only melancholy, the spirit declaring that he is abandoned and has not a friend in the universe. Some do not realize that they are dead, but only that they wander all alone under conditions they could not understand in a cloud of darkness. They are reasoned with and consoled. Gradually they become more gentle. Finally they accept the fact that they are spirits, that their condition is their own making, and that by aspiration and repentance they can win their way to the light."

As a rule these errant souls are unknown to fame. Often, says Dr. Doyle, they are clergymen whose bigotry has hindered development. He quotes from a written lament from no less a person than the "Bloody" Duke of Alva, who describes the hell from which he was "rescued by what seems to me a great merciful dispensation of Almighty God."

"I was present," writes Dr. Doyle, "at the return of one alleged Anglican Bishop of the eighteenth century, who spoke with great intolerance. When asked if he had seen the Christ he answered that he had not and that he could not understand why not. When asked if he still considered the Christ to be God he threw up his hand and shouted violently: 'Stop! That is blasphemy!'

"He was succeeded by a very noisy and bigoted Presbyterian divine who declared that no one but devils would come to a seance. On being asked whether that meant that he was himself a devil he became abusive.

"I quote all this as a curious sidelight into some developments of the subject which are familiar enough to the student, but not to the general public."

While the author fears that his psychic experiences push his travels into the background, he cannot refrain from giving some conversation held with one Bailey, an *opport* medium. Through this medium Sir Arthur heard a long address from Dr. Whitcombe, the learned control, on Assyrian and Roman antiquities and psychic science.

"He chatted," says Sir Arthur, "about the Kings of Babylon as if he had known them all, remarked that the Bible was wrong in calling Belthazar King as he was only Crown Prince, and put in many easy side allusions. On my asking if there were libraries and facilities for study in the next world, he said there certainly were, but that instead of studying books they usually studied the actual objects themselves."

Before leaving Australia Sir Arthur was able to take a birdseye view of his tour and its results. He had in that country addressed twenty-five meetings, averaging 2,000 people in each, or 50,000 people in all. In his view the tour was a complete success. He writes:

"The enemies of our cause were longing for my failure, and had, indeed, in some cases most unscrupulously announced it, so it was necessary that I should give precise details as to this great success and to the proof which it afforded that the public mind was open to the new revelation.

"The end of my journey was uneventful, but my joy at being reunited with my family was clouded by the news of the death of my mother. She was 83 years old, and had for some years been almost totally blind, so that her change was altogether a release, but it was sad to think we should never see the kind face and gracious presence again in its old material form."

Sir Arthur remarks significantly in conclusion, and what he says may fitly enough conclude these brief quotations from his peculiar travel book:

"For my own psychic work she had, I fear, neither sympathy nor understanding, but she had an innate faith and spirituality which were so natural to her that she could not conceive the needs of others in that direction. She understands now!"